

BAL-0003

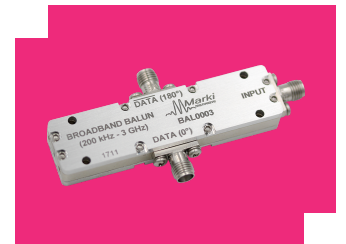
BROADBAND BALUN (200 kHz to 3 GHz)

DEVICE OVERVIEW

General Description

The BAL-0003SMG is a broadband surface mount balun, hand-tuned for optimal phase and amplitude balance over a 500 kHz to 3 GHz bandwidth. It serves as an excellent choice for analog to digital converters, balanced receivers, baseband digital modulations, and signal integrity enhancement.

[Download s-parameters here](#)



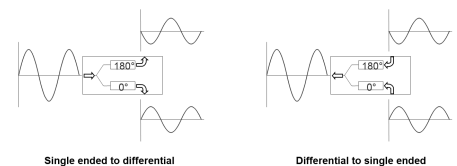
Features

- 200 kHz to 3 GHz Balun (Balanced to Unbalanced Transformer)
- Matched 50 Ohm Impedance on Input and Output Ports
- Tuned for Optimal Phase/Amplitude Balance

Applications

- Analog to Digital Converters
- Balanced Receivers
- Baseband Digital Modulation
- Signal Integrity

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
BAL-0003	BROADBAND BALUN (200 kHz to 3 GHz)	-	-	RoHS	Released	EAR99

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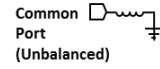
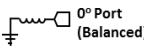
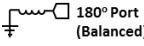
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Revision History

Revision Code	Revision Date	Comment
-	2011-01-01	Datasheet initial Release
A	2014-01-01	Typical Performance plots added
B	2019-10-01	Mixed Mode Scattering Parameters added
C	2019-11-01	RoHs Compliant assembly
D	2020-07-01	Specs Table Update
E	2020-10-01	Specs Table Update

Port Configuration and Functions

Port Functions

Port	Function	Description	Equivalent Circuit for Package
Common Port / In (Unbalanced)	RF Input	The common port is DC short to ground.	 Common Port (Unbalanced)
Out 1 / 0° Port (Balanced)	0° Port	The 0o port is DC short to ground.	 0° Port (Balanced)
Out 2/ 180° Port	180° Port	The 180o port is DC short to ground.	 180° Port (Balanced)

Specifications

Package Information

Parameter	Details	Rating
Weight	-	26g
Dimensions	-	66.04 x 16.76 mm

Electrical Specifications

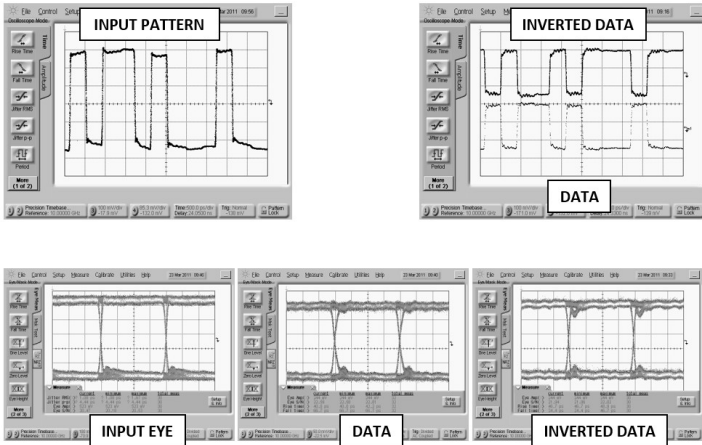
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Insertion Loss as a Mode Converter	-	0.0002	3	-	4	5	dB
Nominal Phase Shift	-	0.0002	3	-	180	-	°
Amplitude Balance	-	0.0002	3	-	0.05	0.5	dB
Phase Balance	-	0.0002	3	-	1	5	°
Common Mode Rejection	-	0.0002	3	35	45	-	dB
Isolation	-	0.0002	3	-	8	-	dB
Risetime/Falltime ¹	-	0.0002	3	-	48	-	ps
Total Input Power	-	0.0002	3	-	-	1	W
VSWR (Input)	-	0.0002	3	-	8	-	-
VSWR (Output)	-	0.0002	3	-	1.7	-	-
Weight	-	0.0002	3	-	27	-	g

^[1] Specified as 90%/10%. Calculated from $\text{Tau_balun2} = (\text{Tau_out2} - \text{Tau_in2})$

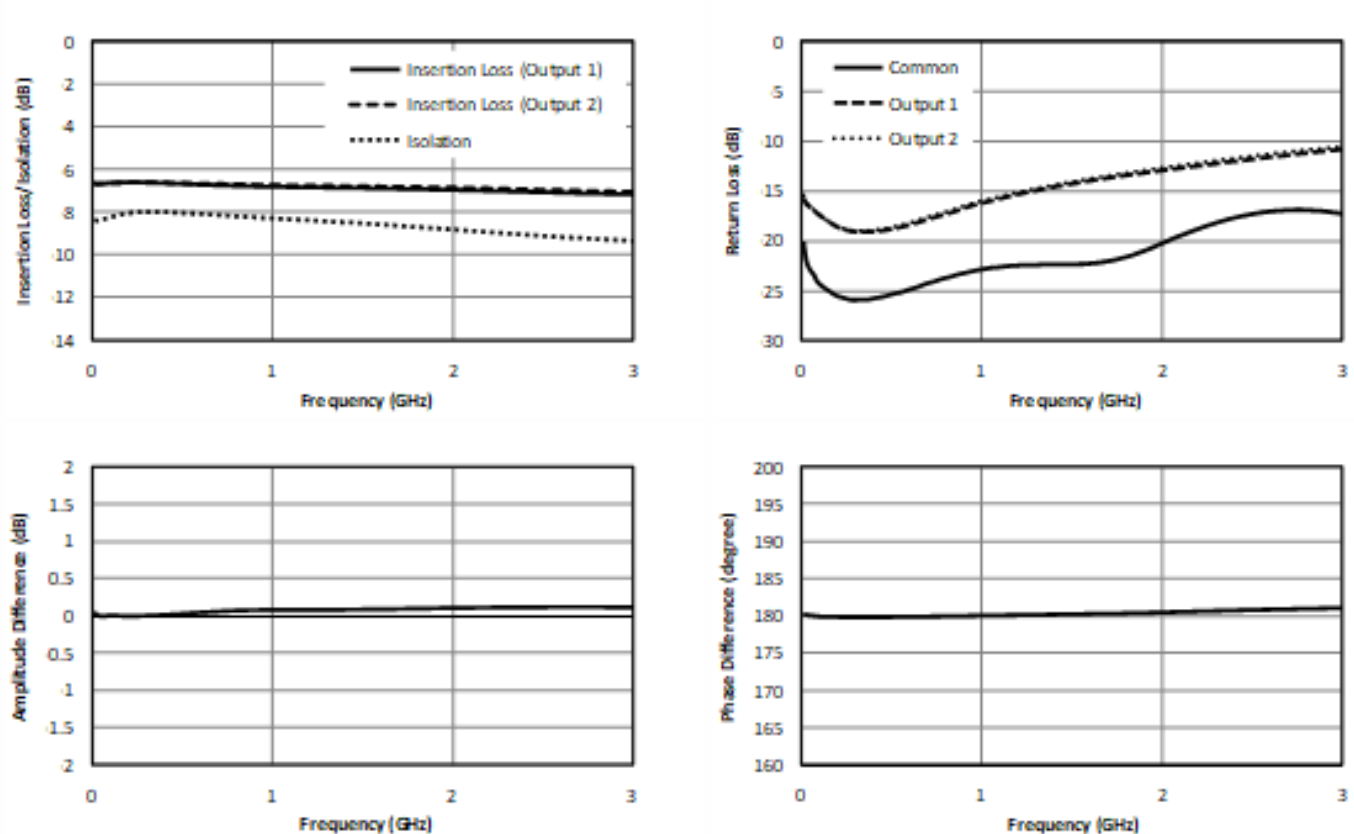
Time Domain Performance Plots

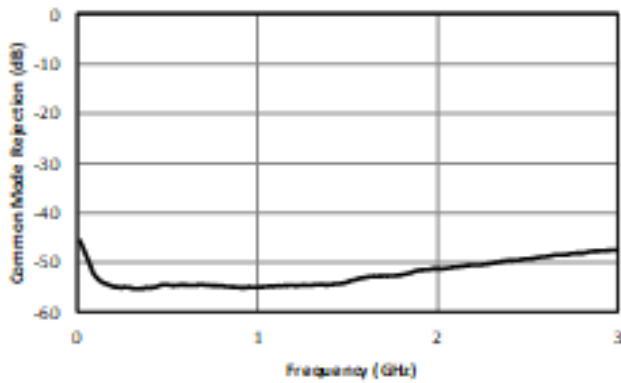
Oscilloscope measurements of the BAL-0003 with a 2.5 Gb/s PBRS pattern. Bit pattern is measured with a 27-1 PBRS input demonstrating extremely good pulse fidelity for both inverted and non-inverted output. Eye diagrams are taken with 231-1 PBRS input demonstrating minimal eye distortion/closure afforded by the extremely low frequency operation of the balun (<200 kHz).



Typical Performance Scattering Parameters

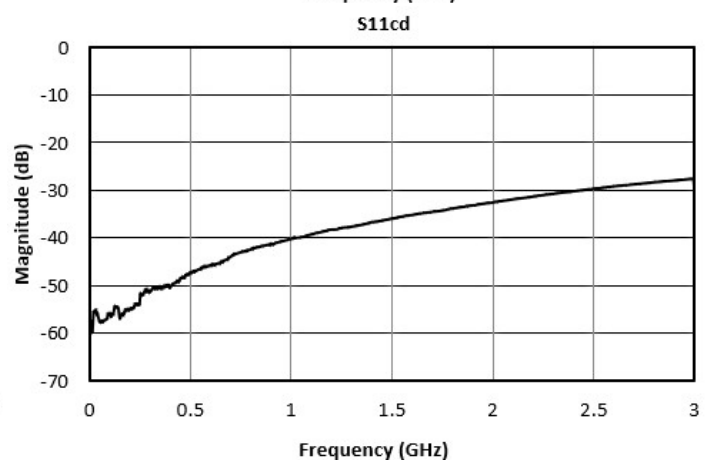
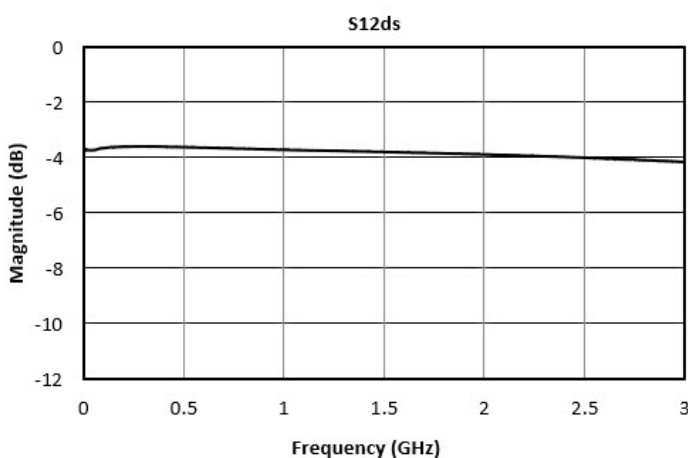
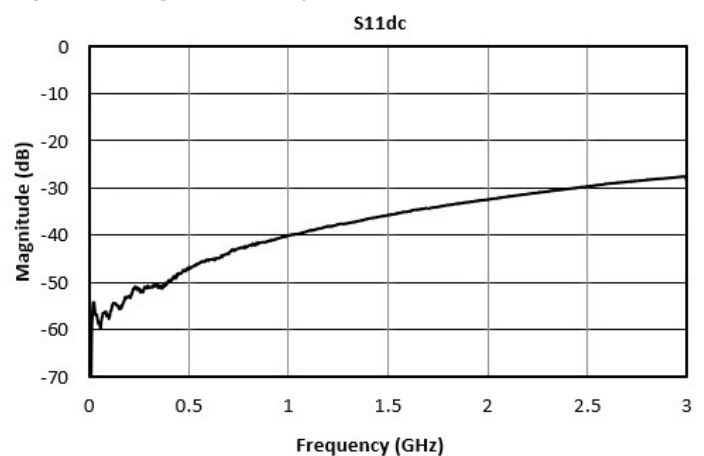
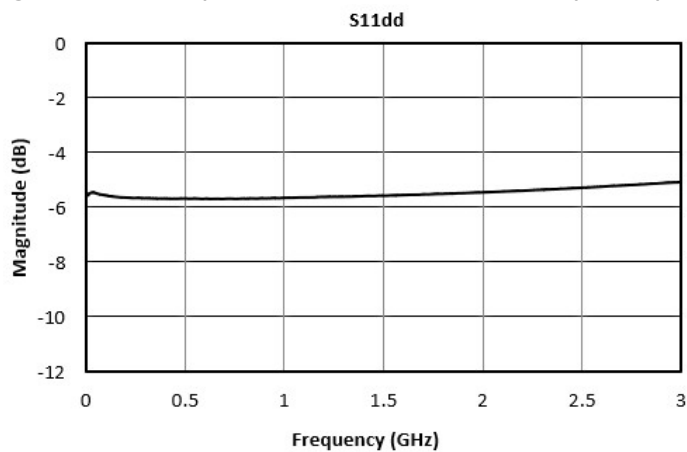
Three port scattering parameters measured as three single-ended 50Ω ports showing relationship between any two ports. For example: S21 and S31, often referred to as insertion loss of a balun, is the output response on ports 2 and 3 with an input stimulus on port 1.

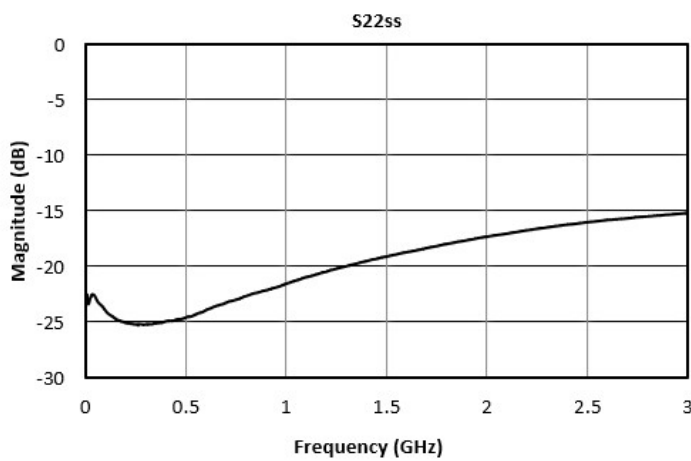
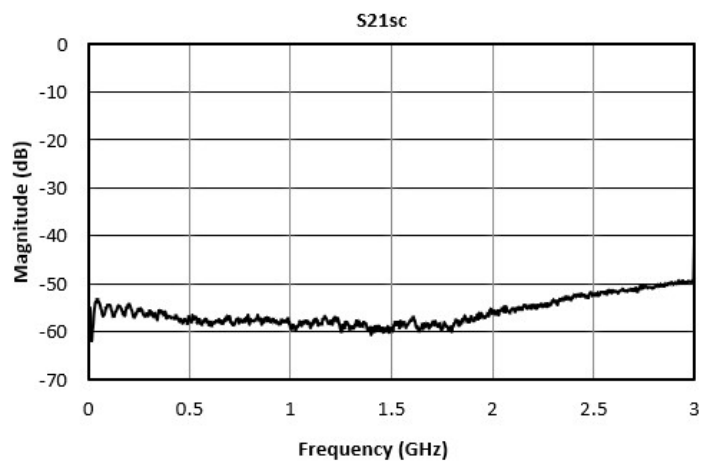
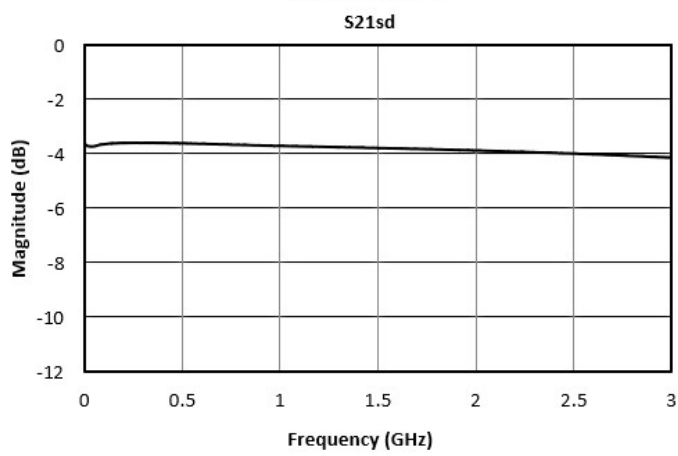
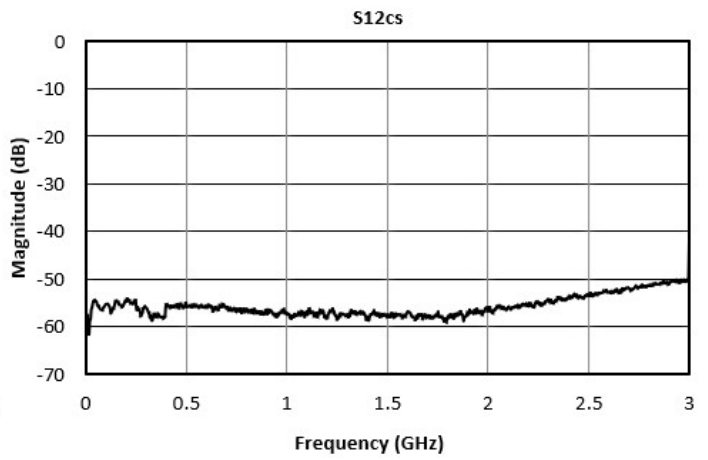
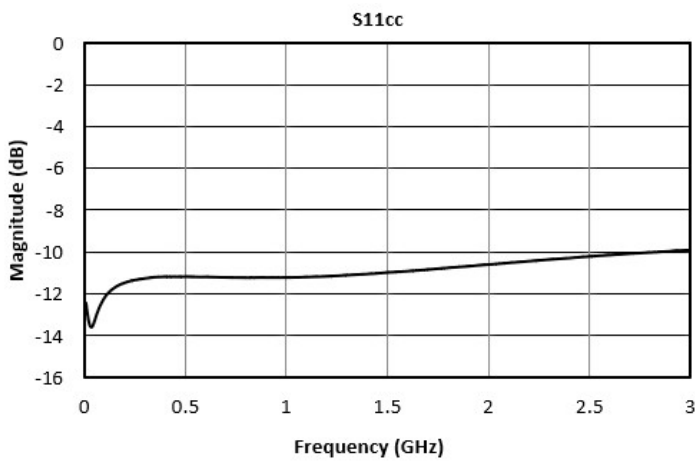




Mixed Mode Scattering Parameters

Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: S12ds is the differential output response given a single ended input.



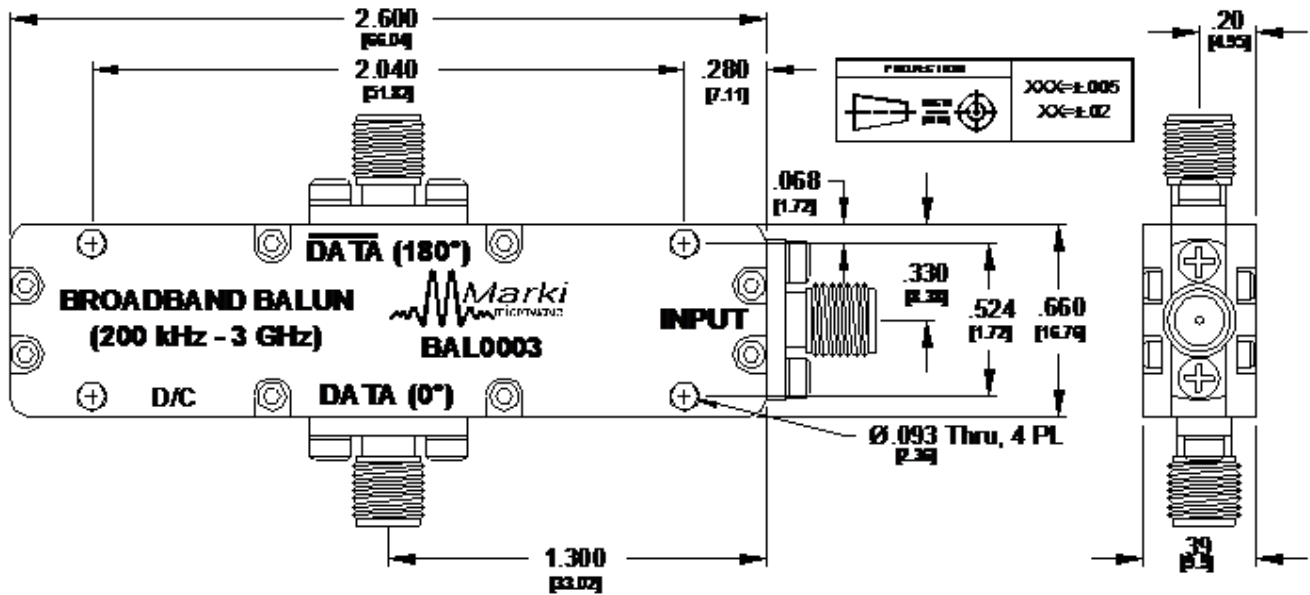


BAL-0003

BROADBAND BALUN (200 kHz to 3 GHz)

Mechanical Data

Outline Drawing



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